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Topic:

*SUN… SAND… SEA…*The 3 S's for National Development and Sustainability for The Bahamas and the Region.

We have more "**SUN** days" in this region than most locations on earth, but we do not have sufficient and reliable energy supply to run our various forms of habitation.

We have some of the most beautiful and enriched **SAND,** but no industries to continuously produce products that can contribute to the growth of or economies.

We are surrounded by the **SEA**, but do not have enough clean water to drink and food to eat.

The **SUN…SAND…SEA**, should be considered much more than what I call "Tourist Attributes", but must be seen as the 3 S's for National Development not only for The Bahamas, but for the region and the world as a whole.

What if the creator, like in the Parable of the Talents, gave us the **Sun**, **Sand** and **Sea**, as gifts and has an expectation that we will accept these gifts, and with the use of our talents, multiple what is possible for the benefit of all mankind? It is my hope that we would not be like the servant in the parable who did not use his talents and decided to bury his gift.

If we are to explore the concept of, **The Smart Sustainable City of the Future,** as a framework for our discussion, I would like to suggest that we consider the many "Design Ideas" that can move us towards a more sustainable environment, while allowing the level of appropriateness of the Design Ideas to our context be used as a determinant of the degree of "smartness", while at the same time allowing us to have a meaningful future.

As a way of reference, the Free Encyclopedia and Wikipedia defines Sustainability, "as the practice of reserving resources for future generations, without any harm to the nature and other components of it." and Sustainable Development, "as the process of meeting the human development goals while maintaining the ability of natural systems to continue to provide the natural resources and ecosystem services upon which the economy and society depend."

I would like to advocate the following:

- The **SUN** is the energy source that is designed for the sustenance of life and the industries we create.
- The **SAND** can provide some of the key minerals for the establishment and development of some of our industries.
- The **SEA** can provide the water and some of the food that is essential to our physical existence.

Let us explore each of the 3 S's…

SUN

The **Sun** is the star at the center of the solar system and is considered the most important source of energy for life on earth. It has been suggested that the Sun has not changed dramatically for about four billion years and it is speculated that it will remain stable for another four billion years….this is encouraging to know!

The Sun's energy supports most of life sources on earth by a process called photosynthesis and is responsible for driving the earth's climate and weather systems. Photosynthesis, as we know from our High School Biology class, if we were not asleep, is a process used by most organisms to convert light energy into chemical energy to fuel the organism's activities. One of the greatest benefits of this process, is that oxygen is released to the atmosphere as a bi-product, which directly benefits us as humans.

The Sun is considered to be decentralized, fully democratic and available to all of us on earth…it has a high degree of certainty that it will raise in the east and set in the west, whether we like it or not! Emem Andrews, A Silicon Valley Energy Entrepreneur (it is interesting how new roles are emerging), posits that, "the sunlight is plentiful and relatively free…we just lack the technology to access it!"

SUN IDEAS

Solar Power

According to the Trans-Mediterranean Renewable Energy Corporation; there is enough solar power that hits one square kilometer of Africa's Deserts to produce the equivalent of one and a half million barrels of oil or 300,000 tons of coal.

The German Aerospace Center estimates that the solar power in the desert of North Africa is enough to supply forty times the present world electricity demand.

The Maryland based New Energy Technologies, have discovered a way to turn ordinary windows into PV panels. The technology uses the world smallest organic solar cell which can generate electricity from both natural and artificial light sources. As an Architect this discovery has tremendous potential for both the design and operation of Buildings. One of the greatest challenges we have in temperate and hot climates, is in the design of "glass boxed" Buildings, and the issue of solar heat gain that require a tremendous amount of air conditioning to keep such Buildings cool. We may now have the opportunity to capture, store and utilize the energy generated from the Buildings we design!

Solar City is a company located in California, and is the provider of Energy Services that designs, finances and installs solar power systems. The company was cofounded in 2006, by Elon Musk, who is considered one of the modern day Inventors and Scientists. The company has become a leading residential solar installer in the US, developing residential communities whose primary energy source is solar.

Energy Generation

Dr. Harry Atwater, of Caltech Center for Sustainable Energy Research, indicated that they are turning sunlight, water and CO2 into storage, transportable fuels called "solar fuels". These solar fuels can completely replace fossil fuels. This is revealing the potential for other discoveries in the generation of energy when we start to combine, in this case, the Sun and the Sea. I wonder what other energies can be discovered when the Sun, Sand and Sea are combined…the possibilities are endless and only limited by our imagination!

Coal sits in crevices and piles in and on the earth, oil is stored in drums, but solar works only when the sun shines and wind only works when the wind blows. These limits remain the largest impasse towards theie widespread renewable adoption. Until solar and wind can provide reliable 24 x 7 base load power, neither will provide a significant portion of our energy supply. Buckminister Fuller, an Architect, Inventor and Designer of the twentieth century, suggested through a "design idea", that we consider the use of a global energy grid that could bring power collected on the sunny side of the earth to the dark side. Since the sun is always shining, what if, with the use of satellites or drone technology, we are able to beam or redirect the sun's rays to any area of the earth so that we can have a consistent and reliable source of energy? Buckminister Fuller, and other Inventors, Designers, and Scientist who came before him, had significant roles to play in finding or suggesting possible solutions to the challenges we faced and continue to face in the world…there is indeed a significant role to be played by the Designers and Scientists!

SAND

The **Sand** is the other natural resource that we have in abundance, it is a naturally occurring granular material which is composed of finely divided rock and mineral particles. It is usually located in inland continental settings and non tropical coastal settings. Sand can be a calcium carbonate, commonly known as aragonite, which has been created over a billion years by coral and shellfish, and is predominately found in areas like the Caribbean.

Another common constituent of sand is silica, usually in the form of quartz and because of its chemical inertness and considerable hardness, is the most common mineral resistant to weathering. The white sand found in tropical and subtropical coastal settings are eroded limestone and may contain coral and shell fragments.

SAND IDEAS

Sand has been discovered to have a variety of uses, some of which include the following:

- In Agriculture as a great source of drainage
- Aquaria for saltwater reefs
- The creation of artificial reefs in the form of sand bags
- The restoration and creation of beaches
- An aggregate in the manufacturing of brick and concrete products
- An ingredient in the manufacturing of glass
- The use for sand blasting, molding, cutting, and a cleaning tool
- The creation of a variety of filtration and purification systems

There are many questions that emerge from some of the uses listed; what other potential uses are possible; what industries can be established that can focus on the manufacturing of products that has sand or the use of sand as one of its ingredients?

SEA

About 97 percent of the **Water** on the planet is too salty for human consumption, and 2 percent is locked up as polar ice, and only about one percent remains for use. It has been demonstrated that without drinking water there is no survival beyond a few days and without water for crops, there is no food. Without clean water there are pervasive diseases, especially killer infectious diseases that claims millions of children's lives each year. Without readily accessible water, there is drudgery in the world's impoverished villages for both women and girls, who often spend hours each day walking many miles to fetch that household's water supply.

Water is totally integrated into our lives including most of what we manufacturer or consume. According to world statistics, 70 percent of the water supply is used for Agriculture; one egg requires 120 gallons of water to produce; there are 100 gallons in a water melon; meat requires 2,500 gallons of water per pound.

It is estimated that about one billion people in the world are without access to safe water, 85 percent of them live in the countryside, of the two million children that die each year from drinking contaminated water, the majority are from the rural areas.

We as humans consume about 50 billion liters of bottle water per year and much of this water is what is known as "fossil water", meaning that it took thousands of years to accumulate in aquifers and is not easily replenished.

Of the water supply that is available for consumption, there is a major concern about water pollution from nitrogen and ammonia from chemical fertilizers which find its way into the groundwater and rivers. Another major source and concern for water pollution is from human waste and is estimated that about 85 percent of sewerage from developing countries is being discharged into the rivers and coastal waters.

Another concern is the over fishing of the waters, which is leading to fisheries loss that is unfortunately nonlinear in its impact on the fish stock. The fish populations are prone to sudden drops as the level of exploitation reaches a point of diminishing returns. A similar assault is happening with the coral reefs as the rising surface temperatures is causing the corals to emit symbiotic algae and this situation is only compounded by the activities of tourism, fishing and boating.

Our planet is considered a "pale blue dot", as recorded by the space astronauts when they took a view of the earth from outer space. This is because the earth is aqueous, since two thirds of its surface is covered by oceans. Those oceans are our backbone and our life blood.

SEA IDEAS

Dean Kamen, a self taught Physicist and Entrepreneur, and DIY Innovator, build a distiller capable of recycling its own energy; he called it the "Slingshot". It is the size of a Dorm room refrigerator, with a power cord, an intake hose and an outflow hose…stick the intake hose into any kind of water, and the outcome is pure grade water.

Vertical Farming is the idea of growing food in water, known as hydroponics, which is growing food in a nutrient rich solution. It is estimated that traditional agriculture use 70 percent of the water on the planet. Hydroponics has proven to be 70 percent more efficient than agriculture. As a part of the future development of our cities, Vertical Farming can offer a viable option to finding a solution to mitigate hunger and malnutrition, while at the same time only requiring 80 percent less land, 90 percent less water and 100 percent fewer pesticides and little to no transportation costs.

Fish Farming

The farming of fish, or Aquaculture, is not a new concept and has its origin in China during the 5th century BC. Historical records reflect that both the Romans and Egyptians cultivated oysters utilizing fish farming, and ever since, this technology has allowed for the continual increase of human consumption. Aquaculture has become one of the fastest growing animal food production systems, supplying nearly 30 percent of our seafood. The practice of Aquaculture protects the ocean and is renewable as well as easily scalable in its production capability. Will Allen, of Growing Power, a Milwaukee based organization, building one of the first Vertical Farms, has designed it in such a way that the First Floor, with 110,000 gallons of water will produce 100,000

tilapia, lake perch and bluegill per year. The fish feces will be recycled to fertilize plants on the higher levels of the greenhouse.

The advocates for Aquaculture suggest that if we are serious about protecting our oceans and preserving seafood as a consistent source for protein, then we need to make it a significant part of our food chain. If we value the health of the ocean, we have to understand that fish are critical to maintaining the integrity of the ocean systems and by extension the planet as a whole.

Sea Energy

Building Dams has developed as a very popular and effective way to collect and divert water for industrial and agricultural uses. The main advantage of the use of dams is that it offers multiple benefits of hydro electricity, irrigation and storage of water. In one of the Islands of the Bahamas, called Eleuthera, we have what I believe is a naturally occurring dam that we call "The Glass Bottom Bridge", that has become more of a tourist attraction than the potential for being utilized as a potential source of energy for Eleuthera.

Virgin Oceanic, a company that was created to explore the deepest underwater areas of the world. It was formed by Richard Branson, Entrepreneur and Explorer, who indicated that they intend to expand the reach of human exploration on the planet. They have designed a submarine transport that can go to 36,000 feet and more below the ocean, where it is believed to be an "unintelligible number" of species. Virgin Oceanic will be promoting and utilizing new technologies that will aid human kind's ability to explore the oceans and assist science in understanding our ecosystems and raise our awareness of our challenges facing the oceans

Recommendations

One of the challenges we face as a species is to balance the need to preserve the resources of the SUN, SAND and SEA, while finding ways to utilize these "gifts" or resources as key components for the creation of new industries and technologies to meet our current and future needs. We are faced with many challenges, some of which are to find ways to continuously feed a growing world population, provide safe drinking water, and eradicate poverty and illiteracy. It was the US President John F Kennedy, who advocated at a Peace Conference at the American University in 1963, more than 52 years ago, that we must find solutions to our challenges and he postulated,…"our problems are man-made; therefore, they can be solved by man, and man can be as big as he wants to be. No problem of human destiny is beyond human beings. Man's reason and spirit have solved the seemly unsolved and we believe they can do it again."

A modern day pioneer, Peter Diamandis, Innovator and cofounder of Singularity University, recently postulated that, "the world's greatest challenges, have become the world greatest business opportunities." We indeed have tremendous opportunities to explore what is possible through the exploration of all of the natural resources or "gifts", and if necessary, through man-made resources, to continuously develop products and services that will be of benefit to all of mankind. Buckminister Fuller, Architect, Author, Inventor, so eloquently posit that, "…if you want to teach people a new way of thinking, don't bother to teach them, instead give them a tool, the use of which will lead to new ways of thinking…"

We need to find ways to encourage each other, and especially the younger generations, to become the new Inventors, Innovators, Investors, Scientists, Designers, Entrepreneurs, Philanthropists, for the twenty first century and beyond, to recognize the "gifts" the world has been given and to utilize our talents, especially our ability to dream and imagine, as some of our "tools" to think of what is possible for a better and sustained world.

THANK YOU!

Main References

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